The Management of Acute and Chronic Pulmonary Abscess

PAUL C. SAMSON, M.D.* and DAVID J. DUGAN, M.D., *Oakland*

PULMONARY abscess is a serious and unpredictable disease. While it has been estimated that from 25 to 35 per cent of patients become well spontaneously, the mortality has been from 30 to 50 per cent in most series of prior years.[1] We have long been opposed to the tendency of many physicians to separate the treatment of lung abscess into a medical phase and a surgical phase. In the not-too-far-distant past it was the custom to set a time limit, usually from six weeks to three months, for the period of purely "medical treatment." If the abscess was not cured by then, the case automatically became surgical. The effects of treating such a serious disease by this routine have been amply reflected in the appalling mortality statistics just quoted. There is now greater appreciation of the fact that pulmonary abscess is a suppurative disease and that because of this, surgical intervention becomes an ever-present possibility. The best results are obtained by the physician and thoracic surgeon working as a close team from the onset of illness. Observation is not treatment. Definitive therapy should be started at once. Radical change in treatment should be accepted by both physician and patient as an inherent part of the therapeutic regimen in this disease.

DIAGNOSIS

It should not be difficult to make a diagnosis of pulmonary abscess. While in a few cases the abscess is undoubtedly due to septic emboli, in the great majority it comes from aspiration, with blockage of a bronchopulmonary segment and distal suppuration. Pulmonary abscesses often follow operations around the mouth, nose, or face. In a majority of the few cases in which there was no such operation prior to the development of abscess, poor oral hygiene is evident.

Many patients show prodromal symptoms of generalized malaise, fever, and fairly localized thoracic pain. This will be followed within a few hours or a few days by sudden or increasing expectoration of large amounts of purulent sputum which layers out on standing. The sputum is not necessarily foul, but is frequently so at the onset. Roentgen studies in the frontal and lateral views will almost always clinch the diagnosis. It must be remembered that a fluid level or cavitation may not be seen on the roentgenogram. This usually means that the abscess has not yet emptied itself sufficiently.

ACUTE ABSCESS

The management of acute pulmonary abscess encompasses general hygienic care, the use of antibiotics and chemotherapy, and the promotion and maintenance of adequate drainage. Careful attention to the therapeutic details described in the following text has resulted in cure in approximately three out of four cases, without resort to surgery. In the other 25 per cent, surgical drainage has been necessary.

The intake of fluids, calories, vitamins and proteins should be adequate. Any deficiencies in oral intake should be made up by the parenteral route. The patients often develop considerable anemia. Iron mixtures may suffice, but if the hemoglobin falls to 70 per cent or below, whole blood transfusions are indicated.

The sulfa drugs and penicillin have been widely used in the treatment of pulmonary abscess. Probably their biggest contribution is in the prevention of invasive infection. The ancillary nature of this therapy must be emphasized. There has been no marked increase in the non-surgical incidence of cure since the beginning of widespread use of sulfa compounds and penicillin. There is some evidence to show that a combination of both drugs may be more efficacious than either one used alone.[5] Penicillin is administered by the aerosol and intramuscular routes. Drug therapy can be overdone, however, and is completely ineffective if the abscess does not drain properly. An abscess cavity may be temporarily sterilized, but it will not heal if a necrotic slough remains.

The most important single factor in cure is to establish adequate drainage. This is characteristic of an abscess in any portion of the body. Because all pulmonary abscesses possess a bronchial connection, it is possible that so-called internal drainage may suffice.

Adequate internal drainage is best initiated and maintained by modified postural drainage and by bronchoscopic aspiration. The type of postural drainage to be used must be individualized. In general, the patient should be instructed to assume the position which makes him cough most, four or five times during the day. Cough is a natural defense mechanism in raising secretions and is a good index as to whether or not postural drainage is being done in the most efficient position. The usual position of postural drainage with the patient hanging over the bed almost straight down from the hips may be harmful if the abscess is in the middle or upper lobes. The bronchoscope is an invaluable means of improving internal drainage. In the past bronchoscopy has been used far too infrequently during the acute phase of the abscess. Bronchoscopy should be one of the earliest therapeutic procedures employed. It has been stated that many patients are too sick to be subjected to bronchoscopy. Rather it should

Presented at the Sectional Meeting of the American College of Surgeons, San Francisco, California, April 7, 1947.

* Assistant Clinical Professor of Surgery, Stanford University School of Medicine, San Francisco, California.

be said that they are too ill not to be bronchoscoped. There are many who still are unconvinced as to the value of bronchoscopy. Such physicians either have not noted the benefit of an efficiently performed bronchoscopy, or they have been swayed by the operator's enthusiasm and allowed repeated bronchoscopies to be performed without appreciable improvement in the patient's condition. This cannot be held against the method, but is an indictment of the bronchoscopist's judgment. The bronchoscope is not an infallible instrument. One must not try to do the impossible with repeated aspirations if progressive clinical and roentgenologically demonstrable improvement does not ensue.

In brief, the bronchoscopist can be depended upon to do the following tasks: (1) Make an occasional diagnosis of unsuspected foreign body or neoplasm as the causative agent of the abscess; (2) remove obstructing secretions from the main and secondary bronchi; (3) elicit selective cough with further evacuation of secretions from the infected lobe; (4) shrink the congested edematous mucosa which in itself can cause visible obstruction of the bronchial airway; (5) pass long curved aspirators into the smaller bronchi of the diseased pulmonary segment and, rarely, directly into the abscess cavity.

In favorable cases the effects of bronchoscopy can be seen within a few days after the first aspiration. In many cases a second or third bronchoscopy at from five to seven-day intervals may be indicated. If, within 14 days after these procedures have been performed, there is still question as to the trend of the illness, it is unlikely that improvement has occurred and the type of treatment should be changed.

Once the patient with pulmonary abscess has come under the physician's care, improvement must be prompt and progressive or surgical operation should be undertaken. The improvement must be both clinical and roentgenologically observable. No abscess is doing well which remains unchanged on the roentgenograms for two or three weeks at a time, even though there has been amelioration of symptoms. Undoubted clinical improvement is manifested by decrease in the cough, reduction in the amount of sputum, a change in the character and odor of the sputum, a reduction in the fever, and an increased sense of well-being on the part of the patient. Should the fever continue at its previous level or should the secretions remain purulent and foul it is certain that drainage is ineffective. Improvement from the roentgen standpoint is manifested by loss of fluid levels, a decrease in the amount of surrounding pneumonitis, and progressive decrease in the size of the abscess cavity. The cavity which remains stationary or increases in size, particularly if there are associated symptoms of impaired drainage, is sufficient indication for surgical intervention.

The decision to initiate surgical intervention usually can and should be made well within six weeks of the onset of the disease. Brisk hemorrhage is an indication for prompt surgical drainage at any time it occurs.

Two pitfalls should be guarded against before operative drainage of a cavity is decided upon. Occasionally an abscess may develop which is merely an acute infective episode associated with chronic bronchiectasis. In such cases the patient does poorly following surgical drainage. A carefully taken history will help to avoid this mistake. Likewise a suppurating pulmonary cyst should not be drained unless the severity of the infection forces this action. Because of their mucosal lining, these cysts will not heal.

Most abscesses can be drained by a one-stage procedure. Since nearly all abscesses are on a pleural surface, adhesions rapidly form between the thoracic wall and the lung. These frequently cover a small area and accurate roentgen localization by means of fluoroscopy, frontal stereoscopic and lateral films is necessary prior to operation. The anesthetic may be either a combination of regional and local block with procaine or nitrous oxide and oxygen. A slightly curved incision is made and sections of one or two ribs together with the intervening intercostal bundle are removed. If the pleural space is not obliterated, an irritating pack of half-strength tincture of iodine or 1-1000 acriflavine solution should be placed against the parietal pleura as the first stage and left in place for approximately seven days. It is wise to recheck with roentgenograms after the first operation to be sure that the abscess is being approached properly. The abscess should be opened with a cautery and the contents evacuated simultaneously with suction. Bleeding is controlled by cautery or by suture-ligature. The cavity is packed lightly with gauze and repacked as necessary until healing takes place. In most instances where destruction of lung has not been too great the abscess cavity will gradually become obliterated by resolution and by re-expansion of the remaining lung. If the healing process is delayed much beyond six weeks and the cavity is clean, some type of filling with free fat grafts or with a pedicled muscle flap is advisable.

In rare instances severe hemorrhage may dictate a one-stage procedure, even in the absence of pleural adhesions. In such cases the area to be cauterized is encircled by mattress sutures which hold the lung in apposition to the chest wall.

Sudden thoracic pain, dyspnea, increased fever, and profound toxemia herald the sudden rupture of a pulmonary abscess into the pleural cavity. In our opinion this serious complication constitutes a surgical emergency. Any temporizing with repeated aspirations and the injection of sulfa drugs or antibiotics is almost certain to end disastrously. Likewise, closed intercostal drainage in this type of acute empyema is unsatisfactory in the extreme. Such treatments frequently result in spreading anaerobic cellulitis or fascitis of the thoracic wall and the mortality then is very high. The treatment of choice is to ignore the abscess for the time being and to open the pleural cavity widely by a long posterior resection of the 8th or 9th rib.[3] Rapid evacuation of infected contents is accomplished and multiple Pen-

rose drains are introduced into the pleural cavity, supported by a large pack. If, and when, the lung re-expands the abscess can be dealt with as necessary at a later date.

CHRONIC PULMONARY ABSCESS

It may be difficult to distinguish accurately between acute and chronic abscess. Pathologically speaking, chronicity in infection means the formation of mature scar tissue and the predominance of round cell infiltration over polymorphonuclear invasion. In pulmonary abscess chronicity is characterized by increased pulmonary destruction and fibrosis of the parenchyma with extensive pneumonitis and bronchiectasis. Some of these changes may occur as early as six weeks after the onset if treatment has failed of undoubted improvement or of cure.

Attention to general hygienic measures is more important in chronic than in acute pulmonary abscess. In particular, severe anemia and protein deficiency inevitably will develop unless proper preventive measures are taken.

In the treatment of chronic abscess bronchoscopy always should be performed for diagnostic purposes and to improve drainage. In rare instances one, or several, bronchoscopies may effect a cure.[4] If the cavity does not have thick walls and if the surrounding parenchyma seems normal, external drainage may be considered. If, however, the area of infection casts a dense shadow with multiple small areas of excavation, if the surrounding parenchyma seems contracted, or if the abscess is thick-walled or unduly large, external drainage probably will fail. As a general rule, the more chronic the abscess the less the chance of cure by drainage procedures. In any event bronchograms should be made before external drainage is decided upon. In the presence of associated bronchiectasis or of bronchial obstruction, external drainage will not succeed.

Signs of chronicity may develop in an abscess which has been inadequately drained. Fistulae will remain widely patent and develop indurated orifices; heavy purulent discharge will persist. While we cannot prove it statistically we have the impression that a true septic infarct which cavitates is less likely to heal following surgical drainage than is an abscess which results from aspiration. In the former instance it may be that the surrounding parenchyma has a permanently poor blood supply which is a factor in the development of chronicity. Occasionally one may be tempted to perform secondary drainage procedures on an abscess which is not "clearing up" properly. Those procedures are frequently unsuccessful because of the underlying irreversible pulmonary damage. In fact, Churchill has failed to cure any recurrent abscess by re-establishing drainage.[2,6] Further drainage may be indicated if a secondary acute abscess develops as an extension of the original process.

It has become increasingly evident that many cases of chronic pulmonary abscess should be treated primarily by pulmonary resection rather than by external drainage. Lobectomy, performed in the modern manner, carries far less hazard than the external drainage of a chronic abscess. If preoperative survey shows an entire lobe to be damaged, total lobectomy should be performed. If the disease is definitely localized, segmental lobectomy may be indicated. The lingular division of the left upper lobe and the superior (dorsal, apical) divisions of the lower lobes lend themselves particularly well to segmental resection. If all lobes on one side are involved, total pneumonectomy by individual ligation is infinitely preferable to attempted cautery penumonectomy. Even though external drainage has been attempted and has failed, resection still can be accomplished. The hazard, however, is increased somewhat because of the greater chance for intrapleural and wound infection. In performing an operation of this type, separate instruments should be used to free up the draining sinus, excise the epithelial portion, invert the remainder and close the overlying skin. The chest is then opened through a separate incision, the operator using clean gowns, gloves, and instruments.

SUMMARY

The hazards of pulmonary abscess are discussed and the necessity for early definitive therapy is stressed.

The treatment of acute abscess is outlined, including provisions for general hygienic care, the role of chemotherapy and the supreme importance of adequate drainage.

The role of bronchoscopy is emphasized in establishing and maintaining curative "internal drainage."

With proper attention to the above details approximately 75 per cent of patients with acute pulmonary abscess can be cured without resort to surgical operation.

The indications for external surgical drainage of acute abscess are listed.

The irreversible pulmonary changes associated with chronic pulmonary abscess are described.

The surgical problem in chronic abscess is contrasted with that in acute abscess.

The value of pulmonary resection in the treatment of chronic pulmonary abscess is stressed.

2938 McClure Street.

REFERENCES

1. Allen, C. I., and Blackman, J. F.: Treatment of lung abscess with report of 100 consecutive cases, J. Thor. Surg., 6:156 (Dec.), 1936.

2. Churchill, E. D.: Resection of the lung, Surg., 8:961 (Dec.), 1940.

3. Dolley, F. S., and Jones, J. C.: Treatment of acute suppurative pleuritis following rupture of lung abscess, J. Thor. Surg., 7:463 (June), 1938.

4. Samson, P. C.: Bronchoscopy in chronic non-tuberculous infections of the lung, Am. Rev. Tuberc., 38:688 (Dec.), 1938.

5. Stivelman, B. P., and Kavee, J.: Penicillin the treatment of putrid lung abscess, Ann. Int. Med., 25:66 (July), 1946.

6. Sweet, R. H.: Lung abscess: Analysis of Massachusetts General Hospital cases, Surg. Gynec. & Obs., 70:1011 (June), 1940.